

Necessities for food safety knowledge and skills at EU level: problems and perspectives of integrations and harmonization

Prof Dr Igor Tomašević

University of Belgrade, Faculty of Agriculture, Nemanjina 6, Belgrade, Serbia.

 <http://orcid.org/0000-0002-1611-2264>  Scopus Author ID: 35100862500

In today's world, responsibility for food safety is divided between food operators accountable for the safety of their products and required to employ preventive measures, notably HACCP related and public authorities exercising second-level control and checking the measures taken by the operators. Even consumers, given the importance of the post-purchase phases have an active role in the maintenance of food safety. The necessity for food safety knowledge and skills along the food chain are evident and we would say even crucial for all food industry stakeholders. Food safety knowledge and skills are necessary to protect consumers and the food industry from unskilled practices in food production. Training of food handlers is critical for preventing food borne diseases (FBD), and the need for continuous education for all involved, with records kept of these activities, is indispensable. Continuing training should be planned and enhanced to emphasize content directed at health risks and for improving the knowledge, attitudes, and practices of food handlers (Stedefeldt et al., 2015).

The food security team and other people who perform activities that have an impact on food safety should be competent and have adequate education, training, skills, and experience. It is the responsibility of the organization to identify these necessary skills, provide training, or take actions to ensure that the staff has these competencies. The organization should also ensure that the people responsible for the monitoring, correction, and corrective action of the food safety management system are trained (ISO, 2005). Increasing the food safety standards implies food safety education (Käferstein, Motarjemi, & Bettcher, 1997). Recommendations such as of the Codex Alimentarius (2009) and food safety laws and standards have been published in order to serve the experts, professionals, foodservice owners and food handlers as their guidance on appropriate procedures to reduce the risk of FBD outbreaks. Without a doubt, individuals engaged in food operations must be informed about them and properly trained. We have evidence that food handlers that had mandatory training were more effective in relation to good food-handling practices in comparison with companies that had a voluntary program (Karaman, Cobanoglu, Tunalioglu, & Ova, 2012).

However, food safety training occurs in a determined political, economic, social, institutional, financial and juridical context. It cannot make up for inadequacies of infrastructure (slaughterhouses, laboratories), of personnel, of resources or of funds, nor can it mitigate the constraints of a given political or territorial structure (FAO, 2005). All of this varies significantly among different EU member states and even more between EU and non-EU countries. In order to prevent discrepancies in the food safety knowledge and skills at EU level, the integration and harmonization of food safety training and education may be the answer. We say may be only because we already know that the transmission of food safety training and education cannot guarantee that it will generate necessary food safety knowledge and skills that will eventually lead to a decrease in the number of FBD.

So let us take a look at a Serbian case study, developing (member candidate) country that has to cope with often limited resources and is lacking food safety educated and/or highly trained personnel within the food industry workforces and veterinary inspectors. This is why Serbia applied the academic food safety training and education approach, also criticized that does not correspond to traditional practices (FAO, 2005), using the rationale of the HACCP to identify priority problems and effective solutions. Training programmes for industry/employees were initially a key role of government;

however, this activity has since been taken over by academia or private consultants. Food safety training methodology addressed two major dimensions of food safety regulation: the economic impact, especially in the framework of (limited) international trade, and public health, particularly at local or regional level. Is there evidence that this approach was successful and to what extent?

Serbian meat industry survey conducted in 2013 (Tomašević et al., 2013) revealed that one of the major difficulties faced when implementing/operating HACCP was the need to retrain supervisory/managerial and production staff. The staff training cost and in particular the cost of external consultants was also deemed as important. When the level of food safety knowledge, among 352 Serbian meat handlers, was investigated their knowledge score was significantly associated with the age, education and participation in the food safety training. (Smigic, Antic, Blagojevic, Tomasevic, & Djekic, 2016). Meat handlers that were <24 years old scored 59%, whereas older participants had better scores, with those aged between 45-54 having the highest obtained knowledge scores of 66%. As expected, the participants with the lowest education (only primary school) scored the lowest values (59%), and the highest educated participants (holding university degree) scored the highest values (76%). This survey provided very important information on the level of food safety knowledge among Serbian meat handlers and difference/gaps in the knowledge among workers from different roles within the meat chain (slaughtering, processing and retail). This was of special importance, as these results served as a base for further improvement in the knowledge and training/educational material and emphasized the need for continuous food safety training among meat workers.

According to the analysis of 48,246 microbiological test results were collected from 130 meat processing plants and 220 meat retail facilities over a seven-year period: 41 months before and 43 months after the food safety re-training has occurred, a strong positive effect on meat handling practices was observed. Significant reductions were perceived in the number of hygiene indicator organisms on all types of surfaces examined and types of meat establishments investigated. The improvement of process hygiene was articulated as aerobic colony count reduction of at least $1.0 \log_{10}$ CFU/cm² for food contact surfaces and over $2 \log_{10}$ CFU/cm² for cooling facilities (refrigerators, freezers and other meat cooling devices). The period after re-training was also marked by a steady decline of positive *Enterobacteriaceae* and *Staphylococcus* samples.

The improved hygienic conditions in Serbian meat establishments encouraged producers to use lower amounts of nitrite. Samples from 268 different meat-producing plants (20,106 in total) revealed that food safety (re)trained meat operators decreased average residual nitrite concentrations in all categories of meat products by 30.65% (Tomasevic et al., 2017). They have also contributed to the decline of average sulphite concentrations for all categories of meat preparations and fresh processed meat products by 43% (from 33.6 to 19.3 mg kg⁻¹). Due to the increased knowledge about chemical hazards in meat processing, a better alignment of practices with the legal provisions was also achieved. The share of non-compliant samples dropped from 18.6% before to 8.3% after the additional food safety training and education has happened (Tomasevic et al., 2018).

The same also benefited Serbian dairy industry where increasing hygiene awareness of farmers and producers through training improved the safety of milk (Smigic, Djekic, Tomasevic, & Miocinovic, 2012; Tomašević et al., 2016). Positive effects of enhanced skills and knowledge were also observed on process hygiene in other types of Serbian food establishments (Djekic et al., 2016). The absence of national food poisoning statistics or national foodborne disease databases are the main obstacle to fully recognize the impact of improved food safety knowledge and skills on food safety and public health in Serbia. However, Serbian case study clearly demonstrates the necessity for food safety knowledge and skills and calls for its integrations and harmonization at EU level including the EU candidate member states.

References:

- Codex Alimentarius. (2009). Food Hygiene (Basic Texts), 4th edn, Codex Alimentarius Commission Joint FAO. *WHO Food Standards Programme, Rome*.
- Djekic, I., Kuzmanović, J., Anđelković, A., Saračević, M., Stojanović, M. M., & Tomašević, I. (2016). Effects of HACCP on process hygiene in different types of Serbian food establishments. [18]. *Food Control*, 60, 131-137.
- FAO. (2005). *European food safety control systems: new perspectives on a harmonized legal basis*. Paper presented at the Global forum of food safety regulators, Bangkok, Thailand.
- International Organization for Standardization (2005). ISO 22000: Food Safety Management Systems- Requirements for Any Organization in the Food Chain (pp. 40): Organization for Standardization.
- Käferstein, F. K., Motarjemi, Y., & Bettcher, D. (1997). Foodborne disease control: a transnational challenge. *Emerging infectious diseases*, 3(4), 503.
- Karaman, A. D., Cobanoglu, F., Tunalioglu, R., & Ova, G. (2012). Barriers and benefits of the implementation of food safety management systems among the Turkish dairy industry: A case study. *Food Control*, 25(2), 732-739.
- Smigic, N., Antic, D., Blagojevic, B., Tomasevic, I., & Djekic, I. (2016). The level of food safety knowledge among meat handlers. [12]. *British Food Journal*, 118(1), 9-25.
- Smigic, N., Djekic, I., Tomasevic, I., & Miocinovic, J. (2012). Implication of food safety measures on microbiological quality of raw and pasteurized milk. [4]. *Food Control*, 25(2), 728-731.
- Stedefeldt, E., Zanin, L. M., da Cunha, D. T., de Rosso, V. V., Capriles, V. D., & de Freitas Saccol, A. L. (2015). Chapter 18 - The Role of Training Strategies in Food Safety Performance: Knowledge, Behavior, and Management. In S. C. Ricke, J. R. Donaldson & C. A. Phillips (Eds.), *Food Safety* (pp. 365-394). San Diego: Academic Press.
- Tomasevic, I., Dodevska, M., Simić, M., Raicevic, S., Matovic, V., & Djekic, I. (2017). The use and control of nitrites in Serbian meat industry and the influence of mandatory HACCP implementation. [35]. *Meat Science*, 134, 76-78.
- Tomasevic, I., Dodevska, M., Simić, M., Raicevic, S., Matovic, V., & Djekic, I. (2018). A decade of sulphite control in Serbian meat industry and the effect of HACCP. [42]. *Food Additives and Contaminants: Part B Surveillance*, 11(1), 49-53.
- Tomašević, I., Šmigić, N., Đekić, I., Zarić, V., Tomić, N., Miocinovic, J., & Rajković, A. (2016). Evaluation of food safety management systems in Serbian dairy industry. [13]. *Mljekarstvo*, 66(1), 48-58.
- Tomašević, I., Šmigić, N., Đekić, I., Zarić, V., Tomić, N., & Rajković, A. (2013). Serbian meat industry: A survey on food safety management systems implementation. [6]. *Food Control*, 32(1), 25-30.